Amended CLAIMS – (clean copy)

1. *(Amended)* A structure for producing a localized light source in a medium, *comprising*
   - a source generating incident light (15, 75),
   - a surface-plasmon-supporting layer (11, 71),

   characterized by
   - means for transmitting and localizing (13; 73) plasmons between said surface-plasmon-supporting layer (11, 71) and said medium (17, 77, 97),
   - said transmitter-localizer means (13, 73) including between said surface-plasmon-supporting layer (11, 71) and said medium (17, 77, 97)
     - a discontinuity (14, 74) for providing a localized electromagnetic field deviation and
     - a plasmon-transmitting interface with predetermined electromagnetic properties at said medium (17, 77, 97)
   - wherein said incident light excites a surface plasmon (16, 76) in said surface-plasmon-supporting layer (11, 71), which plasmon in turn produces said localized light source (48, 78) at said plasmon-transmitting interface by localizing the energy of said surface plasmon.

2. *(Amended)* The structure of claim 1, *wherein* the discontinuity (14, 74) for providing a localized electromagnetic field deviation is a physical discontinuity localizing the electromagnetic field associated with a plasmon generated by said surface-plasmon-supporting layer.

3. *(Amended)* The structure of claim 2, *wherein* the discontinuity (14, 74) consists of or includes one or more protrusions (14, 74) contacting the medium (17, 77).

4. *(Amended)* The structure of claim 2, *wherein* the discontinuity (14, 74) consists of or includes one or more inclusions (54).

5. The structure of any of the preceding claims, *further including* means, in particular a grating (29), for enhancing the generation of surface plasmons by the surface-plasmon-supporting layer (11, 71).

6. The structure of any of the preceding claims, *further including* a substrate (12, 72) carrying the surface-plasmon-supporting layer (11, 71) and the transmitter-localizer (13, 14; 73, 74), and providing a transfer of the incident light (15, 75).

7. The structure of any of the preceding claims, *wherein* the surface-plasmon-supporting layer (31) is made of two or more different materials (32, 33).

8. The structure of any of the preceding claims, *wherein* a plurality of sources for generating incident light (45, 49) is provided for simultaneous or sequential use.

9. The structure of of any of the preceding claims, *wherein* the surface-plasmon-supporting layer consists or comprises a plurality of patches or strips (61) which are individually addressable.

10. The structure of any of the preceding claims, *further including* one or more additional surface-plasmon-supporting layers for enhancing the localized light source.

11. *(Amended)* The structure of any of the preceding claims, *wherein* the various layers and elements of said structure are structured, in particular curved, to enable generating the localized light source in one or several locations of the plasmon-transmitting interface to the medium.

12. The structure of claim 3 or 4, *wherein* the width and/or length of the means for localizing the generated plasmon, in particular of the protrusion (14, 74), is a fraction of the wavelength of the localized light source, preferably less than about one tenth of said wavelength.

13. The structure of claim 1, *wherein* for visible light operation, the surface plasmon-supporting layer consists of or includes any of gold, silver and/or copper.

14. The structure of claim 1, *wherein* for operation in the UV region, the surface plasmon-supporting layer consists of or includes a metal, preferably aluminum.

15. The structure of claim 1, *wherein* for operation in the infrared region, the surface plasmon-supporting layer consists of or includes a metal and/or a metal-oxyde mixture, preferably indium tin oxide.

16. A method for generating a localized light source in a medium (17), *comprising the following steps:*

- generating incident light (15, 75),
- exciting a surface plasmon (16) from said incident light in a surface-plasmon-supporting element (11, 71),

- transmitting said surface plasmon by plasmon transmission means (13, 14; 73, 74) to a localized interface with predetermined electromagnetic properties between said plasmon transmission means and said medium (17), so that said localized light source is generated at said interface.

17. *(New)* The method for generating a localized light source according to claim 16, *wherein*
surface plasmons (16) are excited only on the side of the surface plasmon-supporting element (11, 71) attached to the plasmon transmission means (13, 14; 73, 74).

18. *(New)* The method for generating a localized light source in a medium (17), *wherein*
surface plasmons (16) are excited on both sides of the surface plasmon-supporting element (11, 71).

19. *(Renumbered)* Use of a structure according to any of the claims 1 to 15 and/or the method according to claim 16 for optical lithography.

20. *(Renumbered)* Use of a structure according to any of the claims 1 to 15 and/or the method according to claim 16 for optical data storage.

21. *(Renumbered)* Use of a structure according to any of the claims 1 to 15 and/or the method according to claim 16 in or for biochips.

22. *(Renumbered)* Use of a structure according to any of the claims 1 to 15 and/or the method according to claim 16 for high resolution optical microscopy.

Guo et al "Nanoscale silicon field effect transistors fabricated using imprint lithography", Appl. Phys. Lett., Vol. 71, pp. 1881-1883 (1997).

A paper authored by M. Paulus and O.J.F. Martin, the inventor, entitled "Light propagation and scattering instratified media: a Green's tensor approach", J. Opt. Soc. Am. A/Vol. 18, No. 4, April 2001, discusses a technique of computing the electromagentic field that propagates and is scattered in three-dimensional structures formed by embedded bodies. Though paper this may help in understanding the physical background of and even may give rules for determining appropriate and useful dimensions for implementing the present invention, it does not disclose its concept.

In the context of the present invention and its application for lithography, it must be understood that it is not necessary for a photosensitive layer to be illuminated through its entire thickness. Using for example top surface imaging, it is sufficient that the very top layer of the system is exposed, see V. Rao et al. "Top surface imaging process and materials development for 193 nm and extreme ultraviolet lithography", J. Vac. Sci. Technol. B, Vol. 16, pp. 3722-3725 (1998). Therefore, a limited source, even if it does not extend very deep into the photoresist, does not limit the resolution achievable with a photolithographic process.

Finally, some recent advances in biosensors and biochips relevant to the present invention shall be sketched. A biosensor is a device that consists of a biological recognition element, or bioreceptor, e.g. an antibody, an enzyme, a protein, a nucleic acid, whole cells, tissues or entire organism. Tremendous progress has been achieved over the last ten years in the integration of biosensors onto microchips, to create so-called biochips, see T. Vo-Dinh "Nanosensors and biochips: frontiers in biomolecular diagnostics", Sensors and Actuators B, Vol. 74, pp. 2-11 (2001). Working on a nano-

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metric scale, in addition to increasing the resolution, also provides additional benefits related, for example, to short diffusion distances, high surface/volume ratios and small heat capacities.

The interaction of light with biological or chemical material is one of the key diagnostic techniques implemented on a biochip. A biochip can be comprised of only the reactive system, or also integrate excitation (illumination, current, etc...) and detection entities. Since a biochip usually consists of arrays of probes used for different biochemical assays, a localized light source

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